[Translation from German]

HYDROTEC Technologies GmbH & Co. KG
Düngstruper Strasse 46, 27793 Wildeshausen

Cover for a Manhole Top and Manhole Top

The invention concerns a cover for a manhole top with a cover body and with at least one locking means arranged on the cover body, said locking means having a spring section and, arranged thereon, an engagement section that can be brought into engagement with a part of a frame. In addition, the invention concerns a manhole top with such a cover and with a frame accommodating said cover.

Manhole tops with such a locking system, whose engagement usually takes place in the manner of a detent or catch, are known and are widely used. As an example, reference is made in this connection to WO 86/04624, which discloses a self-locking manhole cover in which the locking means has a resilient arm that has one end cast to a stiffening rib on the underside of the cover body, and extends with its other free end to a portion of the circumference of the cover essentially parallel thereto. A detent projection that sits at the free end of the resilient arm, at right angles to its longitudinal extent, is provided as the engagement section. In order to latch the detent projection in a corresponding recess in the frame, or to release it therefrom, the resilient arm is

elastically movable at right angles to its longitudinal extent, the detent projection being appropriately preloaded in the direction toward the frame by the resilient arm.

The present invention now proposes to attach the spring section by each of its two ends to the cover body while keeping it otherwise separated from the cover body, and to arrange the engagement section between the two ends of the resilient arm.

On account of the inventive construction, the spring section functions in the manner of a leaf spring that is fixed at both ends. It has become evident in this context that the inventive construction permits realization of a locking system that functions with particular effectiveness while at the same time being especially easy to use.

Preferably the spring section extends approximately parallel to the cover body.

An especially preferred embodiment of the invention is characterized in that the spring section is designed as an annular body, which is attached to the cover body by a retaining section that essentially joins the two ends of the spring section. As a result of the fact that, in this embodiment, the two ends of the spring section are essentially closed to form an annular body, the spring section functions as a dual leaf spring arrangement with two parallel leaf springs, wherein one half of the annular body, between whose ends the engagement section is located, performs the function of the first leaf spring, and the second half of the annular body, between whose ends the

retaining section is located, performs the function of the second leaf spring. The efficiency of the spring action can be increased even further by such a design.

As a general rule, the annular body can have any shape, as long as the spring section is curved such that its two ends meet or are at least arranged adjacent to one another.

For example, the annular body can have the approximate shape of a circle, wherein the engagement section is usefully arranged at a location essentially diametrically opposite the retaining section.

Alternatively, however, the annular body can also have the shape of, e.g., an oval with two, preferably semicircular, curved sections and two essentially elongated sections connecting these two curved sections to one another. The reason being that the shape of such an elongated oval is especially useful for increasing the spring action. The retaining section should preferably be located on one elongated section, with the engagement section located on the other elongated section. The elongated section bearing the engagement section can preferably be recessed relative to the ends of the curved sections that are connected by this elongated section, by which means the annular body can be adapted especially well to the design circumstances, with regard to the desired spring action as well as with regard to the space required.

The engagement section usefully has a wedge-shaped detent section, by means of which the engagement functions as a catch. Accordingly, the detent section is provided

with at least one surface inclined in the direction of engagement. In addition, it is also possible to design a surface inclined in the opposite direction on the detent section as well, for easier release. Alternatively or in addition, however, it is also possible to design the corresponding engagement surfaces on the frame part with a wedge shape or inclined as angled surfaces.

The locking means is usually located on the underside of the cover body.

When the cover is provided with stiffening ribs, the locking means should be located on the cover body a distance apart from the stiffening ribs, by which means an especially space-saving arrangement of the locking means results.

Lastly, it should be noted for the sake of completeness that at least two locking means should usually be provided on the cover, with said locking means being spaced apart from one another and usually located opposite one another, and radially opposite one another in the case of a circular cover.

A preferred example embodiment of the invention is described below on the basis of the attached figures. Shown are:

Fig. 1 a perspective view from below of a cover for a manhole top;

Fig. 2 a perspective view from below of an arrangement of the cover from Fig. 1 on a frame;

Fig. 2a an enlarged sectional detail view of Fig. 2;

Fig. 3 a cross-section through the arrangement of cover and frame shown in Fig. 2; and

Fig. 3a an enlarged sectional detail view of Fig. 3.

Fig. 1 shows a perspective view from below of a disk-shaped cover 10, which forms a manhole top in combination with a suitable annular frame that is described in detail below.

The cover 10, of which the underside can be seen in Fig. 1, has a disk-shaped cover body 12 whose perimeter is bordered on its underside by a circumferential web 14 that projects downward. This circumferential web 14 serves as a support when the cover 10 is used in a frame, as described below. In addition, the cover body 12 is provided on its underside with stiffening ribs 16 extending radially.

Located on the underside of the cover body 12 at each of two radially opposite locations, located in each case between two adjacent ribs 16 and the circumferential web 12, is a locking means 20 that is provided on its outer side, facing the circumferential web 14, with a detent projection 26 that faces radially outward.

Figs. 2 and 3 also show the associated annular frame 30 on which the cover 10 rests and which forms, together with the cover 10, the manhole top. As can be seen from Fig. 3a in particular, the frame 30 in the example embodiment shown has on its inner

side an inward-projecting circumferential support surface 32 that lies in a plane that extends essentially horizontally in the installed state of the frame 30. With the cover 10 placed in the frame 30, the cover 10 rests with its downward-projecting circumferential web 14 on this annular support surface 32 of the frame 30, so that the support surface 32 serves as a support for the cover 10 on the frame 30.

When placed in the frame 30, the cover 10 is locked to the frame 30. The aforementioned locking means 20 are attached to the underside of the cover body 12 for this purpose.

The precise structure of the locking means 20, in particular, is evident in Fig. 2a. In the example embodiment shown, each locking means 20 has a closed annular body that lies in a plane extending essentially parallel to the disk-shaped cover body 12. In the example embodiment shown, the annular body is comprised of a closed strip-shaped element that extends essentially at right angles to the disk-shaped cover body 12. As is further evident from Fig. 2 in particular, the annular body consists of two approximately U-shaped curved sections 21 and 22 and two essentially elongated sections 23 and 24. The two elongated sections 23 and 24 connect the curved sections 21 and 22 together, by which means the annular body thus produced has an approximately oval shape.

The annular connecting means 20 is cast to the underside of the cover body 12 through a retaining section 25 at the elongated section 24 facing the center of the cover body

12, while the rest of the annular connecting means 20 is separated from and spaced apart from the underside of the cover body 12.

The detent projection 26 sits in a radially outward-facing position on the edge of the elongated section 23 that faces the edge of the cover 10. Here, the detent projection 26 is located at a point on the annular body of the locking means 20 essentially radially opposite the retaining section 25. As is further evident from Fig. 2a in particular, the locking means 20 has a bilaterally symmetrical shape whose axis of symmetry (not shown) extends essentially radially. The retaining section 25 and the detent projection 26 also lie on this imaginary axis of symmetry.

It is further evident from Fig. 2a in particular that the elongated section 23 that bears the detent projection 26 is recessed slightly with respect to the ends of the curved sections 21, 22 that are joined together by this elongated section 23. Therefore, in the example embodiment shown, the shape of the locking means 20 also slightly resembles the outline of a butterfly.

The section of the oval locking means 20 that is separated from the cover body 12, and is comprised of the two curved sections 12, 22, the elongated section 23, and the outer edge sections of the elongated section 24, produces a spring action after the manner of an arrangement of two parallel leaf springs in the radial direction with respect to the stationary retaining section 25. In this way, the detent projection 26 is elastically preloaded in the radial direction.

Since the annular locking means 20 in the example embodiment shown is formed as a single piece on the cover body 12 with the aid of the retaining section 25, the locking means 20 is made of the same material as the cover body 12. This is usually a cast material, with which the desired spring action of the locking means 20 can be achieved easily due to the above-described design.

As is evident from Fig. 3a in particular, locking of the cover 10 onto the frame 30 takes place with the aid of the locking means 20 by the means that the detent projection 26 engages below an inward-projecting web 34 located on the inner side of the frame 30, in that an angled surface 28 on the outer side of the detent projection 26 comes into contact with a correspondingly inclined mating surface on the bottom of the web 34. In this regard, when the cover 10 is placed in the frame 30, the detent projection 26 undergoes a forced motion in the direction toward the center of the cover 10 against the radial preloading exerted by the oval locking means 20. In this process, the oval locking means 20 compresses slightly in the direction of the retaining section 25 in that the separation between the two elongated sections 23 and 24 is correspondingly decreased. The same temporary change in shape of the oval locking means 20, which is enhanced by the design described above, also occurs when the cover 10 is removed from the frame 30, thereby bringing the detent projection 26 out of engagement with the mating surface 36 on the frame 30.